Do Trust-Based Relations Improve Firm's Performance? Evidence from Transition Economies

George Berulava

18. July 2013

Do Trust-Based Relations Improve Firm's Performance? Evidence from Transition Economies

George Berulava*

July 2013

Abstract

The purpose of this paper is to analyze the impact of trust-based relations on firm's performance in transition economies. The trade credit variable is used as a proxy of trust-based relations and the propensity score matching method is employed to establish casual link between relational governance and business performance in the study. The research is conducted using data from a large survey of firms across 28 transition economies. The results of the study suggest that informal trust-based institutions of contract governance represent an important way for enhancing of business performance. To say distinctly, our findings indicate that in transition economies trade credits positively affect firms' sales growth. They provide incentives for more intensive innovation activities and ensure higher labor productivity rates. The firms that trust their partners are characterized by larger proportions of reinvested profits as well. The main contribution of this paper is that it provides new empirical insights into the casual link between trust-based relations and business performance of firms in transition economies.

JEL Classification: L14, D23, P31, Z13

Keywords: trust-based relations, trade credit, networks, propensity score matching, business performance, transition economies

* George Berulava – Research Fellow at P. Gugushvili Institute of Economics, Tbilisi, 0105, 14 Kikodze str.; email: george.berulava@gmail.com

1. Introduction.

The experience of transition economies shows that one of the key issues in the process of a market transformation of centrally-planned system is a creation of consistent and reliable institutional framework (World Bank, 2001; World Bank, 2002). The importance of the proper institutional framework for economic development stems from its ability to shape incentive structure of economic agents, which influences their investment and innovation decisions (Johnson, McMillan and Woodruff, 2002). According to North (1990), the existing difference in economic development levels among countries can be explained by the differences in an institutional environment, which involves both formal and informal rules of governing of a market economy. The lack of such institutions results in various types of market frictions, which hamper productive performance of firms in transition. In particular, market frictions such as the shortage of market information about partners and improper legal system of contract enforcement have a substantial impact on the efficiency of inter-firm relations (McMillan and Woodruff, 1999). In the absence of sound formal institutions of contract enforcement, businesses in transition employ informal relational mechanisms of governance based on trust. Though the importance of such trust-based relations for firms in transition economies is emphasized in a significant number of academic papers its affect on economic performance of firms remains relatively unstudied. Do firms that rely on trust in dealing with their partners are better off than firms that don't trust their partners? Despite its importance there is no empirical answer to this question to the moment. One of the reasons of the lack of empirical studies of this problem is the methodological difficulty related to determination of the causal link between trust-based governance and business performance.

The present paper seeks to fill this gap by exploring the effects of trust-based relations on business performance of firms in transition economies. To overcome the methodological problem of the causality identification, propensity score matching techniques (Rosenbaum and Rubin, 1983) is employed in the paper. The results of this study are intended to improve the understanding of the consequences of trust-based relations for the business performance of firms in transition economies, and thus they extend the existing theoretical framework.

The rest of the paper is organized as follows. Section 2 examines the existing literature in the fields of research related to trust-based relationships. Based on the literature review, the research hypothesis is formulated. In section 3 we turn to a discussion of the research methodology, including empirical strategy and measures. The data set and characteristics of variables used in the study are described in section four. The fifth section provides analysis into the study results. The final remarks are presented in section 6.

2. Literature Review.

The key element of informal or relational governance is the trust (Bradach and Eccles, 1989). The concept of trust that underlies relational contractual arrangements is based on social norms and personal relations (Lewis, 1985). Heide and John (1992) show that norms play a very important role in structuring economically efficient relationships between independent firms. They argue that supportive norms have significant economic value when specific assets need to be safeguarded. Mitigating possibility for opportunistic behavior and reducing uncertainty, trust reduces pressure toward vertical integration (Granovetter, 1985). Macaulay (Macaulay, 1963) in his preliminary study of non-contractual relations in business found that the norms of keeping commitments impose obligations on parties to transactions at the cost of damaging personal relationships. Arrow emphasizing the role of trust as a control mechanism defines it as "…an important lubricant of a social system" (Arrow, 1974; p. 23). He states that "…In the

absence of trust, it would become very costly to arrange for alternative sanctions and guarantees, and many opportunities deriving from mutually beneficial cooperation would have to be forgone." (Arrow, 1969; p. 62). The role of informal trust-based institutions takes on special significance for firms operating in transition economies. Such institutions allow firms to cope with the issues of high transaction costs, uncertainty and scarce information in dealing with their partners and thus facilitate smooth functioning of the economies in transition.

The performance of trust-based informal institutions in transition economies has been explored in a number of studies. Raiser, Allan and Steves (2004) based on the data from a large survey of firms across 26 transition countries examine the determinants of trust in the transition process. Using 'the level of prepayment demanded by suppliers from their customers in advance of delivery' as a proxy for trust they confirm earlier findings that trust is higher where firms have confidence in third party enforcement through the legal system. Other findings of the study can be summarized as follows: the fairness and honesty of the courts are a more important determinant of inter-firm trust as compared to the courts' efficiency or ability to enforce decisions; networks based around personal ties – family and friends – and business associations are important determinants of the development of trust, while business networks based on enterprise insiders and government agencies are not; country-level effects are significantly more important factors of inter-firm trust than are firm-level effects. Berulava and Lezhava (2008) using data from a sample of Georgian manufacturing enterprises find that trust along with traditional dimensions of transaction cost economics (asset specificity and uncertainty) has a significant impact on the choice of exchange governance mode. They discovered that trust produced by informal institutions such as networks comprised from friends and relatives as well as from business associations play important role in facilitating relationships between manufacturers and distributors in Georgia. Steer and Sen (2010) study the role of informal and formal institutions behind the growth of private sector in Vietnam. They show that firms have increasingly taken on risks in their transactions in spite of weak formal institutions. According to the results of the study, informal institutions remain important as mechanisms of risk management even as the economy matures and new formal institutions gradually develop.

McMillan and Woodruff (1999) examining trade credit issues in Vietnam find that in a weak contract enforcement environment, informal institutions serve as a substitute to a legal system. In particular, business network formed by relatives or friends functions as important source of information, thus generating trust and promoting exchange. Similarly, the survey of managers of privately-owned manufacturing firms in Russia, Ukraine, Slovakia and Romania provides evidence that relationship contracting works as a substitute for the courts (Johnson, McMillan and Woodruff, 1999). The same time, the authors find that though relational contracting was the basis of the most transactions in all of the countries, the law also did matter. The study results suggest that information from other economic agents, long period of cooperation and high switching costs support trade credit.

Though trust–based relational contracting is generally viewed as substitutes for complex contracts in interorganizational exchanges, there is some evidence that formal contracts and relational governance function as complements (Poppo and Zenger, 2002). Using data from a sample of information service exchanges, Poppo and Zenger (2002) find empirical support for the proposition that formal and informal relations complement each other.

The importance of informal trust-based transaction governance mechanisms for firms in transition economies has been emphasized also in number of recent studies. Zheng Zhou, Poppo and Yang (2008) on the basis of the analysis of 361 buyer-supplier exchanges indicates that managers rely more on relational ties as asset specificity and uncertainty increase and that

impersonal institutions govern market transactions. Nguyen and Liem (2013) investigate the sources of inter-firm trust in order to give a basement for building inter-firm trust. Based on disciplines such as relationship marketing, social exchange theory, management authors formulate the conceptual model to facilitate trust between partners in inter-firm relationships intentionally. The study of Wang et al. (2013) drawing on the information processing view, resource-based view, and transaction cost theory, explicates how buyer performance can result from buyer's use of relation-specific information processing solutions and supplier's relational responses. The authors find that as buyers and suppliers utilize the IT and relational solutions, they induce relation-specific responses represented as supplier's business process investments and modification flexibility, which in turn lead to positive buyer outcomes. Wang and Yang (2013) explore antecedents of inter-firm opportunism and the process variables that mediate the relationship between inter-firm opportunism and organizational performance. The study reveals that goal congruence has the largest influence on inter-firm opportunism, followed by cultural sensitivity, communication, and environmental volatility, norms, governance emphasis, and relative dependence. The authors find that inter-firm opportunism affects organizational performance through a mediating process including commitment, functional conflict, overall satisfaction, and trust. Lavie et al (2012) on the basis of the analysis of non-equity alliances in the information technology industry examine performance implications of alliance partners' organizational differences and demonstrate how these effects are mediated by relational mechanisms.

Summarizing, the existing research reveals that trust-based contracting can work as a substitute or complement for legal institutions, thus reducing transaction costs and facilitating exchange between firms. However, the same time the literature acknowledges that such type of relationships can cause some inefficiency in firm's performance as well. For instance, McMillan and Woodruff (1999) argue that informal relationships come with efficiency costs, since better exchange opportunities from economic agents outside of the network could be lost. Similarly, according to Johnson, McMillan and Woodruff (1999), relational contracting along with aiding contract can bring some inefficiency. Thus the question of interest is the net result of the trust-based relation's affect on the business performance. Are firms better off when they are engaged in informal relations with partners or the opposite statement is true?

Despite its importance, to the moment the overall impact of informal contract relationships on the firm's performance remains relatively unstudied in economic literature. The existing studies of trust-based relations focus mainly on exploration of its determinants and various types of governance structures, while economic consequences of such relationship received very sparse attention from academicians. The lack of the interest from academicians to the empirical studies of the link between relational contracting and firm's performance can be explained by the distinctive emphasis within existing relevant theories as well as by methodological difficulties. According to Sako (2002) the functionalist approach of transaction cost economics (TCE) paradigm shifts attentions of researchers from outcomes of relational contracting to its determinants. She states that according to TCE researchers "…whatever governance structure exists is best for the organization given its environment and circumstances." (Sako, 2002; p.93) Notwithstanding of the above arguments, we believe that the identification of whether the trust-based contracting represents the best governance option for firms in transition economies still is topical. This paper aims to shed light on exactly this issue by exploring the effect of trust-based relations on various indicators of firm's performance in transition economies. In particular the main research question of the paper is as follows

- Do firms employing trust-based relations perform better in terms of productivity, innovations, and sales than firms not relying on such institutions?

To get the answer on this question, first of all let's consider the ways in which trust-based relationships can improve firm's functioning. Sako (2002) emphasizes three mechanisms through which trust may enhance business performance. First, trust-based relationship allows for reducing of transaction costs and thus it ensures the most efficient governance structure. Second, trust stimulates investments in specific assets, which in turn guarantees future returns and productivity growth. Third, trust encourages orientation towards joint problem solving in such matters as cost reduction, innovation, management promoting thus continuous learning and enhancement. Based on the empirical study of automotive industry in Japan and USA the author shows that supplier's trust of customers generally is associated with its better performance in terms of costs, profit margins, just-in-time (JIT) delivery and joint problem solving (Sako, 2002). Similarly, Dyer (1996) based on the results of his empirical study, emphasizes asset co-specialization and lower transaction costs (which are outcomes of trust-based hybrid/alliance governance structures) among the factors that provide Japanese automotive firms with competitive advantage over their U.S counterparts.

Helper and Sako (1995) examine the links between trust-based relationship and business performance. The authors show that long-term, closely linked relationships have performance advantages for automakers and their suppliers in both the United State and Japan. Dyer and Wujin Chu (2003) in their study of the relationship between supplier trust in the buyer and transaction costs and information sharing in supplier-automaker exchange relationships in the U.S., Japan, and Korea, find that perceived trustworthiness reduces transaction costs and is correlated with greater information sharing in supplier-buyer relationships. The authors argue that trust is unique as a governance mechanism because it not only minimizes transaction costs, but also has a mutually causal relationship with information sharing which also creates value in the exchange relationship. The relational contracting proved its efficiency in transition economic environment as well. Hendley, Murrell, and Ryterman (1998) in their study of transactional strategies of Russian enterprises found that during transition, strategies that use trust have a critical importance as well as personal relationships.

Based on the review of the results of existing studies, the research hypothesis of the paper can be formulated as follows: ***employing informal trust-based relations improves overall performance of firms in transition economies***.

It worth to mention, that though the existing empirical studies reveal positive association between informal relationships and firm's performance they say nothing about the casual link between these variables. Is trust a cause of a better business performance? Or is the reverse causation true. This question remains unanswered to the moment. Among the methodological issues mentioned above, the problem of identification of the direction of the causal link between trust-based relations and business performance is a prominent one. Exactly this methodological problem explains for the most part why this link remains relatively unstudied to the moment. In this paper we plan to overcome the problem of identification of the casual link between trust-based relations and business performance by employing propensity score matching procedure (PSM) (Rosenbaum and Rubin, 1983). Our empirical strategy is discussed in more detail in the next section.

3. Methodology.

In this section we describe the empirical strategy and the measures employed in the study.

Empirical Strategy. The main objective of the current research is to test theoretical hypothesis on the impact of informal trust-based relationships on the business performance of firms in transition economies. In this study we use trade credit as a proxy for trust-based governance. As it was mentioned above, one of the key econometric problems when estimating the effects of trade credit (i.e. trust-based governance) on the business performance is the causality issue. The PSM techniques employed in this study, allows us to delineate the casual effects of trade credit on business outcomes. This method imitates a controlled experiment and assumes creation of a counterfactual that is similar to the treated population by matching them on a variety of variables in order to control for observable differences. For instance, the counterfactual question of the study can be formulated as follows: "What would have happened to the firms which, in fact, did receive 'treatment' (in our case the firms that trust their partners through providing them trade credit), if they had not received 'treatment' (no trust)?" The advantage of this approach is that it facilitates identification of the direction of causality between variables of interest.

Our empirical strategy implies implementation of a number of consecutive steps. At the first stage we calculate propensity scores, to account for non-randomness in which firms provide trade credit. The propensity score allows coping with the issue of selection bias by comparing groups based on observed covariates and thus it represents a good tool for estimation the treatment effect when treatment assignment is not random. Propensity scores are estimated using the following logit regression for the probability that a firm gives trade credit (trusts) to its partner:

$$P(y_i = 1 | x_i) = \frac{e^{\beta' x_i}}{1 + e^{\beta' x_i}} \qquad (1)$$

where y_i is i firm's choice of the mode of relationship with partners ($y_i = 1$ if firms provides trade credit to its partner and $y_i = 0$ otherwise); x_i is a set of observed covariates (discussed in more detail in the next section); β' – vector of parameters to be estimated.

According to Rosenbaum and Rubin (1983), comparing firms with a similar probability of providing trade credit given the observables in x_i is equivalent to comparing firms with similar values of x_i. Thus after calculation of propensity scores, on the next step, the actual matching procedure is conducted. In particular the "kernel" matching technique is employed in this study. The advantage of this approach is that it allows for maximum use of all the observations. Based on propensity scores the matching procedure implies estimation of a counterfactual for each treated observation.

Assuming that the effect of residual factors on treatment assignment net of treatment propensity is ignorable, we can calculate the expected casual effect of the treatment (providing trade credit) on the performance of firm. This effect is known as average treatment effects for the treated (ATT). The ATT measures the effect of providing trade credit on the outcome variable for those firms that actually provided trade credit compared with what would have happened if they had not relied on trust-based relations with partners (no trade credit). For individual firm the average treatment effect on the treated can be calculated in the following way:

$$ATT = E[q_{i1} - q_{i0} \mid y_i = 1] \qquad (2)$$

where q_{i1} - is potential output of firm *i*, which is exposed to treatment (firm provides trade credit); q_{i0} - is potential output of firm *i*, which represents a control group not exposed to treatment (firm doesn't provide trade credit).

To check the robustness of obtained results the balance check of covariates and sensitivity analysis are assumed in the study.

Measures. To explore the potential impact of trust-based relations (providing of trade credit) on firm's performance, a number of ***outcome variables*** are used in this study for which the corresponding ATT are identified. These outcome variables reflect various aspects of firm's performance and are constructed in a different ways. These variables are:

Sales Growth – dichotomous variable is coded as 1 if over the last 36 months a firm experienced increase in sales and is coded as 0 otherwise.

Innovation – normalized factor score, which reflects innovative activities undertaken by a firm during the last 36 months. Following Carlin, Schaffer and Seabright (2004) we use principal component factor analysis to construct this variable from the following four innovation variables: developing successfully a major new product line/service; upgrading an existing product line/service; creating a new joint venture with foreign partner; obtained a new quality accreditation (ISO 9000, 9002 or 14,000, AGCCP, etc). The results of the factor analysis are provided in the Appendix (Tables A1.1-A1.5). In addition to the factor score we use two dichotomous variables which reflect whether the firm has developed successfully a major new product line/service and upgraded an existing product line/service respectively.

Percentage of Reinvestment – is measured as percentage of total profits reinvested in a firm.

Labor Productivity – this variable is measured as a logarithm of the ratio of sales volume (in USD) to a number of full-time employees.

The ***dependent variable*** in the logit regression – *Trade Credit* – is a dichotomous variable constructed from the continuous variable which reflects the percentage of firm's sales' to customers over the last 12 months that were sold on credit. The variable is coded as 1 if more than ten percent of sales were sold on credit and coded as 0 otherwise.

The choice of covariates, used in calculation of propensity scores, is based on the theoretical framework and the existing literature (Raiser, Allan and Steves, 2004; Johnson, McMillan and Woodruff, 1999; Carlin, Schaffer and Seabright, 2004). However, only limited number of variables are used this study in order to avoid the violation of the *common support assumption*. These variables are assumed to influence both the decision to provide trade credit and firm's performance.

First, following Raiser, Allan and Steves (2004) we include variables that reflect existing legal system and networks.

Legal System – is constructed on the basis of principal components factor analysis using five questions, each employing 6-point scale. The respondents were asked about how often they associate the following descriptions with the court system in resolving business disputes. These descriptions are: fair and impartial; honest/uncorrupted; quick; affordable; able to enforce its decisions (see the results of the factor analysis in the Appendix: Tables A2.1-A2.5).

Factor analysis was used in construction of *Network* variables as well (see Appendix: Tables 3.1-A3.5). Initially network variables were measured in the following way. On a 5-point scale ranging from extremely important =5 to not important =1 respondents rated the importance of the following sources of information on new customers: family and friends; former employees who now work for a potential customer or supplier; prior employment of managers by a potential customer or supplier current distributors; existing customers or suppliers; government agencies, business associations and other sources. Similar to Berulava and Lezhava (2008) study, factor solution suggest on existing of the two types of network variables:

Narrow Networks – include information from narrow group of people such as family and friends; former employees who now work for a potential customer or supplier; prior employment of managers by a potential customer or supplier current distributors; existing customers or suppliers.

Broad Networks – include information from a broader group of sources such as government agencies, business associations and other sources. Other controls employed in the study are:

Internal Funds/Working Capital – percentage of firm's working capital financed from internal funds or retained earnings.

Internal Funds/Working Capital - percentage of firm's new fixed investment financed from internal funds or retained earnings. Both variables serve as proxies for capital market constraints (Raiser, Allan and Steves, 2004).

Customer Change - dummy variable for whether firm has changed its major customer in last 3 years.

Payment Delay - dummy variable for whether firms have ever experienced an overdue payment.

Sales to Government - percentage of domestic sales to government.

Sales to Multinationals - percentage of domestic sales to multinational companies located in host country.

New Firm - dummy variable for whether firms are newly established entities.

Competition – measures degree of competition using the number of competitors reported by the respondent in the market for its main product. Based on the answers, three dummy variables are created: no competitors; 1-3 competitors; more than 3 competitors.

Following Carlin, Schaffer and Seabright (2004) we incorporate three additional variables that influence decision of firm to innovate in the models that estimate the effect of trade credit on innovation decisions of firm. These variables reflect the importance for firms while they make their decisions on the developing new products or services and markets of each of the following factors:

- *Domestic Competitors*;
- *Foreign Competitors*;
- *Customers*.

Industry / country controls are also used in the study.

4. Data Description.

The main source of the data for the research is the micro-level dataset from the Enterprise Surveys program (Business Environment and Enterprise Performance Survey (BEEPS) III

round)[1]. The survey was conducted by the European Bank for Reconstruction and Development (EBRD) and the World Bank Group (the World Bank) for 9,655 firms in 28 countries in the European and Central Asian region in 2005. In all countries where a reliable sample frame was available, the sample was selected using stratified random sampling. Three levels of stratification were used in all countries: industry, establishment size and region. The more detailed description of the sampling methodology can be found in the Sampling Manual[2].

Table 1, presents a description of the key variables used in the study. According to the data from this table, out of 9,655 observations, fifty four percent of firms reported improvement of their performance in terms of sales growth over the last 36 months. On average almost half of the profit earned by the firms in the sample was reinvested in firms. Another important dimension of firm's performance used in the study is innovation. According to table 1, over the period of last three years almost thirty five percent of firms introduced a new product line, half of the sample upgraded existing product, more than twelve percent obtained a new quality accreditation ISO, and only four percent of firms opened a new plant. The average rate of labor productivity for the sample (out of 6,984 observations) is approximately thirty six thousands of USD per employee. Trade credit as a mean of relationships with the partners is employed by a half of the firms in the sample (out of 9,595 observations).

The evaluation of the legal system reveals that ability of court to enforce its decisions received the highest rating, while its affordability and quickness the lowest. Among the network sources of information existing customers/suppliers have the highest level of credibility. Government agencies and business associations are the least trusted sources of information on business partners.

Almost half of the firms in the sample have ever experienced an overdue payment and about twenty two percent have changed a major customer in last three years. The share of sales to government and multinationals doesn't exceed five percent each. Around seventy percent of working capital and new fixed investments is financed from the internal funds.

New firms represent approximately eighty percent of the sample. Most of the firms (70.1 %) encounter intense competition (facing with more than three competitors), while about twenty four percent of firms have only 1-3 rivals. Only six percent of firms reported that they have no rivals. According to table 1, pressure from domestic rivals and from customers is the most important incentive of innovation for the firms in the sample. The threat from the foreign rivals seems to be less important stimulus for innovation.

Table 1. Descriptive statistics

Variables	Mean	Standard deviation	Number of observations
Sales growth	.540	.50	9,655
New product line	.349	.48	9,655
Upgrade of existing products	.502	.50	9,655
Opening a new facility	.042	.20	9,655
Obtained a new quality accreditation ISO	.125	.33	9,655
Reinvestment of profits (percent)	49.530	40.07	7,781
Labor productivity (thousands of USD)	35.859	160.81	6,984
Trade credit	.500	.50	9,595
Court: fair/honest	2.923	1,37	8,339
Court: quick/affordable	2.760	1.23	8,418

[1] https://www.enterprisesurveys.org/
[2] http://www.enterprisesurveys.org/~/media/FPDKM/EnterpriseSurveys/Documents/Methodology/Sampling_Note.pdf

Court: can enforce its decisions	3.363	1.52	8,665
Information about customer: Family and friends	2.507	1.38	9,461
Information about customer: Former employees/ managers	2.303	1.17	9,136
Information about customer: Existing customers or suppliers	3.414	1.30	9,369
Information about customer: Government agencies	2.200	1.35	9,242
Information about customer: Business associations	2.154	1.31	9,246
Information about customer: Trade fairs/others	2.746	1.42	9,320
Payment delay	.504	.50	9,655
Change of major customer	.218	.41	9,655
Sales to government (percent)	4.259	14.35	9,327
Sales to multinational corporations (percent)	3.925	13,72	9,327
Working capital financed from internal funds (percent)	72.270	37.39	9,430
New fixed investments financed from internal funds (percent)	70.136	39.85	6,836
New firm	.793	.41	8,806
No competitor	.060	.24	8,411
One-to-three competitors	.239	.43	8,411
More than three competitors	.701	.46	8,411
Pressure from domestic competitors: not at all important	.136	.34	9,526
Pressure from domestic competitors: slightly important	.187	.39	9,526
Pressure from domestic competitors: fairly important	.347	.48	9,526
Pressure from domestic competitors: very important	.330	.47	9,526
Pressure from foreign competitors: not at all important	.459	.50	9,212
Pressure from foreign competitors: slightly important	.182	.39	9,212
Pressure from foreign competitors: fairly important	.190	.39	9,212
Pressure from foreign competitors: very important	.169	.37	9,212
Pressure from customers: not at all important	.121	.33	9,466
Pressure from customers: slightly important	.158	.36	9,466
Pressure from customers: fairly important	.337	.47	9,466
Pressure from customers: very important	.385	.49	9,466

Table 2 presents a comparison of firms that provide trade credit to their partners with those that don't, with respect to the outcome variables used in the study. Estimation of the mean differences was performed using cross-tabulation for bivariate output variables, and one-way ANOVA for the continuous variables.

Table 2. Comparison performance outcomes of the firm with and without trade credit (in percent)

Output variables	**Trade Credit**	**No Trade Credit**	**Difference**	
			Pearson ch.sq. (df)	F-stat. (df)
Sales growth	56.5	51.6	23.679(1)***	-
New product line	39.4	30.4	84.963(1)***	-
Upgrade of existing products	55.1	45.5	88.408(1)***	-
Opening a new facility	4.6	3.8	3.948(1)**	-
Obtained a new quality accreditation ISO	15.9	9.1	100.75(1)***	-
Reinvestment of profits	55.3	43.8	-	162.92 (1)***
Labor productivity(in thousands of USD)	43.67	27.4	-	17.74 (1)***
*** — statistically significant at $p < 0.01$ level; ** — statistically significant at $p < 0.05$ level; * — statistically significant at $p < 0.1$ level.				

According to the table 2, firms that employ on trust-based relations with partners perform much better compared to those that don't trust their customers on all performance indicators. In particular, higher proportion of firms that provide trade credits experienced sales growth over the last 36 months; they reinvest higher proportions of profits in their businesses.

Firms that trust their partners innovate more in terms of introducing new product lines and plants, upgrading existing products and adopting new quality standards; they have higher labor productivity level as well. All results are statistically significant at one or five percent significance levels.

However, this kind of analysis reflects only unconditional differences in performance between two types of firms. To say distinctly, the data provided in table 2 indicates just on how trust-based relations are associated with performance outcomes of the firms. Due to non-random selection of trade credit, one cannot ascertain whether the trade credit has a casual effect on firms' performance from this analysis. To explore the casual link between trust-based relations and firms performance we employ a propensity score matching techniques, which allows for dealing with non-random selection issue. The results of this analysis are discussed in the next section.

5. Study Results.

In this section, we discuss the empirical results of the study. First, using logit regression we predict firm's choice of giving a trade credit to a partner and on the basis of this analysis the propensity score is calculated. Next, based on the calculated propensity scores, the matching procedure is conducted and the impact of trade credit on performance outcomes is measured. Finally, the sensitivity analysis of the study results is performed to check their robustness.

Trade Credit Prediction. The dependent variable in our logit regressions is dichotomous, which reflects whether or not firm provides trade credit to its partner. Propensity scores are calculated separately for each of six outcome variables[3]. Since three innovation variables share the same model we have results of four logit regressions presented in Table 3. The explanatory power of the all regression is quite satisfactory since all models are statistically significant at one percent level and pseudo R^2 are above 10%.

As it was expected the broad networks comprised from business associations and government agencies has a positive and statistically significant (at $p<0.001$ level) impact on the probability of providing trade credits. Surprisingly narrow networks (friends and family members; customers and suppliers; former employee and managers) have opposite effect on the choice variable to what one would have expected. The same is true for legal system variable which reflects efficiency and reliability of the courts, though this result is not statistically significant. Other control variables show more or less expected results.

The Impact of Trade Credit on Business Performance. The kernel matching procedure for estimation of average treatment effect is used to identify the impact of the trust-based relationships (trade credit) on the business performance in this study. We first analyze how well balanced are the covariates employed in the study. The data necessary for balance checking is provided in the appendix (Table A4). According to the table A4, t-tests for equality of means in the treated and non-treated groups after matching are non significant for all covariates. Also the standardized bias after matching is less than 5% for all variables, indicating on good balancing of the data.

To ensure the common support assumption we removed all treatment observations whose propensity score is higher than the maximum or less than the minimum propensity score of the controls. The number of 'off support' observations dropped from the four models employed in our study is negligible (see Appendix: Table A5).

[3] STATA command psmatch2 is used for this purpose.

Table 3. Trade Credit Logit Regression Results

Dependent variable: trade credit/no trade credit				
Covariates	**Models with outcome variables:**			
	Sales growth	Labor productivity	Percentage of reinvestment	Innovation
Legal system	-.196 (.166)	-.169 (.204)	-.135 (.182)	-.234 (.170)
Narrow networks	-.113*** (.036)	-.099** (.042)	-.087** (.040)	-.129*** (.038)
Broad networks	.155*** (.036)	.151*** (.042)	.143*** (.039)	.109*** (.037)
Internal funds/working capital	-.003** (.001)	-.003** (.001)	-.004*** (.001)	-.002** (.001)
Internal funds/new fixed investment	-.002* (.001)	-.001 (.001)	-.001 (.001)	-.002** (.001)
Payment delay	1.060*** (.075)	1.020*** (.087)	1.016*** (.081)	1.055*** (.076)
Service	-.449*** (.074)	-.462*** (.087)	-.458*** (.080)	-.407*** (.076)
New	.019 (.094)	.121 (.106)	-.009 (.104)	.010 (.096)
Sales to government	-.003 (.002)	-.002 (.003)	-.002 (.003)	-.002 (.002)
Sales to multinationals	.011*** (.002)	.010*** (.003)	.011*** (.002)	-
Customer change	.205** (.083)	.156 (.096)	.075 (.091)	-
Competition_1 (no competitors)	-.094 (.180)	-.050 (.202)	-.033 (.196)	-.075 (.189)
Competition_2 (1-3 competitors)	.061 (.083)	.135 (.097)	.125 (.090)	.141 (.085)
Country controls	Yes	Yes	Yes	Yes
Pressure from domestic competitors_1	-	-	-	-.166 (.148)
Pressure from domestic competitors_2	-	-	-	-.307*** (.117)
Pressure from domestic competitors_3	-	-	-	-.151 (.093)
Pressure from foreign competitors_1	-	-	-	-.555*** (.115)
Pressure from foreign competitors_2	-	-	-	-.276** (.127)
Pressure from foreign competitors_3	-	-	-	-.178 (.126)
Pressure from customers_1	-	-	-	.092 (.156)
Pressure from customers_2	-	-	-	.076 (.118)
Pressure from customers_3	-	-	-	.219** (.090)
Model fit				
LR chi2(df)	861.05 (38)	660.23 (37)	740.32 (38)	862.64 (46)
Prob> chi2	0.0000	0.0000	0.0000	0.0000
Pseudo R2	0.1498	0.1560	0.1504	0.1547
Number of observations	4154	3071	3557	4029
Notes: Standard errors in parentheses; *** — significant at $p < 0.01$ level; ** — significant at $p < 0.05$ level; * — significant at $p < 0.1$ level.				

According to the table 4, in support to the main hypothesis of the study, we find that in general, trade credit improves business performance of companies. In particular, trust-based relations (trade credit) tend to increase sales of firms. The difference for treated and control groups is above six percentage points and is statistically significant at the one percent level. Trust-based relations stimulate innovative behavior as well. The effect of trade credit on firms innovation is statistically significant at $p<0.05$ level[4]. This is especially true for the successful development of a major new product line/service and upgrading of an existing product line/service. Firms that trust to their partners invest more in their business. The share of reinvested profits is higher by six percent for the firms that provide trade credit to partners (statistically significant at one percent level). These firms are also more productive in terms of labor productivity compared to firms that don't rely on trust (significant at $p<0.01$ level).

Table 4. Estimated Average Treatment Effect on Treated (ATT) for Trade Credit

ATT	**Outcome variables**					
	Sales growth	**Labor productivity**	**Percentage of reinvestment**	**Innovation (factor score)**	**Introducing new product**	**Upgrading existing product**
Treated	.60603	3.36259	56.40054	.29577	.43965	.60530
Controls	.54070	3.15469	50.47600	.27432	.38076	.55745
Difference	**.06532*** **	**.20789*** **	**5.92454*** **	**.02145** **	**.05889** **	**.04785*** **
Standard Error	.01938	.04809	1.64058	.00980	.02007	.02068
T-statistic	3.37	4.32	3.61	2.19	2.93	2.31
Notes: *** — significant at $p < 0.01$ level; ** — significant at $p < 0.05$ level; * — significant at $p < 0.1$ level.						

Generally, the results of ATT estimation, obtained from kernel matching estimation procedure coincides with unconditional matching outcomes discussed in the previous section. However, the ATT estimation present more precise results and allow for identification of causality direction.

Sensitivity Analysis. In this study the significant effect of trust-based relations (trade credit) on firm's performance is found on the basis of propensity score matching procedure. However, since PSM cannot control for unobservable characteristics, the question is whether these results are robust to unobservable variables. To say distinctly, an unmeasured confounding variable may impact selection into the treatment and thus undermine the conclusions. To find how strongly 'hidden biases' might affect the results of the study we employ sensitivity analysis proposed by Rosenbaum (2002). Since the outcome variables of different nature (both dichotomous and continuous) are used in this study, we apply two alternative procedures of sensitivity analysis: Hodges-Lehmann point estimates[5] (DiPrete and Gangl, 2004) for continuous variables and Mantel and Haenszel (1959)[6] test statistic for discrete ones (Becker and Caliendo, 2007). The results of sensitivity analysis presented in tables 5 and 6 show that robustness to hidden bias varies significantly across the different outcomes.

Table 5 reports the Hodges-Lehmann point estimates results for continuous outcome variables: innovation (factor score); percent of reinvestment and labor productivity. These results show that the outcomes under consideration are sensitive to potential impact of unobservable variables. For reinvestment and labor productivity outcome variables, the

[4] The negative sign is due to reverse coding of the raw innovation variables.
[5] Stata command: rbounds
[6] Stata command: mhbounds

Hodges-Lehmann point estimates encompass zero at gamma=1.5 and gamma= 1.7 respectively. These values mean that the unobserved characteristic would have to increase the odds ratio by less than 50% and 70% respectively before it would bias the estimated impact. The situation is even worse with respect to innovation variable, the treatment effect becomes insignificant at gamma=1.1. These relatively low values (less than critical value of 2) imply that the treatment effects for reinvestment, labor productivity and especially for innovation are sensitive to unobserved characteristics. Thus some caution is needed when interpreting the results based on these findings.

Table 5. Rosenbaum bounds sensitivity analysis: Hodges-Lehmann point estimates for variable Trade Credit

Outcome variables	**Gamma***	**Significance level**		**Hodges-Lehmann point estimate**		**Confidence interval (95%)**	
		upper bound	lower bound	upper bound	lower bound	upper bound	lower bound
Innovation (factor score)	1	.039688	.039688	.011511	.011511	-.00089	.024168
	1.1	.556352	.000129	-.000593	.023821	-.00795	.034481
	1.2	.969456	3.4e-08	-.006949	.032859	-.016587	.0474
	1.3	.999738	1.2e-12	-.014305	.044614	-.026727	.057475
	1.4	1	0	-.023525	.054505	-.032436	.065984
	1.5	1	0	-.030376	.062149	-.039059	.074346
	1.6	1	0	-.035184	.069965	-.045978	.081305
	1.7	1	0	-.041526	.077077	-.052382	.086434
	1.8	1	0	-.04762	.082586	-.058048	.092908
	1.9	1	0	-.053162	.087132	-.063492	.100064
	2.0	1	0	-.058143	.093047	-.069299	.105434
Labor productivity	1	0	0	.236014	.236014	.192472	.279169
	1.1	0	0	.19869	.273084	.155112	.316232
	1.2	4.3e-13	0	.164651	.306743	.120728	.350033
	1.3	3.8e-09	0	.133374	.337708	.088928	.381133
	1.4	3.2e-06	0	.104324	.36609	.059458	.409722
	1.5	.000413	0	.077101	.392606	.032222	.436286
	1.6	.012154	0	.051859	.41715	.006847	.461038
	1.7	.109546	0	.028206	.440235	-.017279	.484071
	1.8	.395415	0	.006112	.461703	-.040144	.505904
	1.9	.740909	0	-.014978	.482001	-.061703	.526836
	2.0	.934632	0	-.035224	.501179	-.082063	.546281
Percentage of reinvestment	1	1.1e-16	1.1e-16	5.34297	5.34297	3.77527	6.46069
	1.1	7.3e-11	0	3.92317	6.3305	2.45332	8.02064
	1.2	7.5e-07	0	2.72005	7.68218	1.45339	9.67885
	1.3	.000405	0	1.71697	9.11178	.752616	10.8417
	1.4	.022713	0	1.01281	10.45	.030805	11.9178
	1.5	.227328	0	.437799	11.2935	-1.0688	13.5442
	1.6	.664071	0	-.337541	12.4413	-2.10398	15.1517
	1.7	.936273	0	-1.32086	13.9492	-3.14728	16.0382
	1.8	.994814	0	-2.24069	15.2914	-3.91679	17.2543
	1.9	.999806	0	-3.15281	16.0447	-4.55536	19.0195
	2.0	.999996	0	-3.83573	17.1031	-5.35743	20.3552
Note: * - gamma - log odds of differential assignment due to unobserved factors							

The results of sensitivity analysis for discrete variables - sales growth, introduction of new product line and upgrading existing products – are presented in Table 6. According to the Table 6, the average treatment effect is statistically significant even at high levels of gamma.

This means that the average treatment effect estimated for these output variables are insensitive and robust to the presence of hidden bias.

Table 6. Mantel-Haenszel bounds sensitivity analysis for variable Trade Credit

Outcome variables	Gamma*	Mantel-Haenszel statistic		Significance level	
		overestimation of treatment effect	underestimation of treatment effect	overestimation of treatment effect	underestimation of treatment effect
Sales growth	1	2.59199	2.59199	.004771	.004771
	2	8.32586	13.6621	0	0
	3	14.8527	20.3319	0	0
	4	19.5811	25.2127	0	0
	5	23.3252	29.1111	0	0
	6	26.4452	32.3851	0	0
	7	29.1326	35.2259	0	0
Introducing a new product	1	5.82678	5.82678	2.8e-09	2.8e-09
	2	4.79182	16.7106	8.3e-07	0
	3	11.0985	23.3149	0	0
	4	15.6576	28.1623	0	0
	5	19.2689	32.038	0	0
	6	22.2835	35.2928	0	0
	7	24.8871	38.1148	0	0
Upgrading existing product	1	5.60945	5.60945	1.0e-08	1.0e-08
	2	5.19933	16.6642	1.0e-07	0
	3	11.6133	23.3612	0	0
	4	16.2355	28.2737	0	0
	5	19.88	32.2016	0	0
	6	22.9057	35.5012	0	0
	7	25.503	38.3633	0	0
Note: * - gamma - odds of differential assignment due to unobserved factors					

Summarizing, the sensitivity analysis of the impact of trade credit on firm's performance variables shows mixed results. While some output variables are sensitive to hidden bias the other are quite robust with respect to potential impact of unobserved characteristics. However, one should realize that sensitivity analysis doesn't reveal the existence of hidden biases per se; rather it indicates how the treatment effect can be influenced by these biases.

6. Conclusions.

The purpose of this paper was to analyze the impact of trust-based relations on firm's performance in transition economies. We use trade credit as a proxy of trust-based relations in this study. In particular, the question we seek to address in this study was, "does trade credit to customers improve business performance of firms that provide it?" The answer to this question may have important implication for the development of best business relation practices for the firms in countries in transition. However, an empirical test of this issue has not been implemented to the moment because of the complications involved in establishing of a causal link between trust-based relations and business performance. We address this problem by using propensity score matching method to establish counterfactuals for firms that provide trade credit to their customers, and matching these companies with similar firms that don't trust their customers based on characteristics that affect both the probability of choice for providing trade credit and business performance outcomes. Specifically, we employed covariates that reflect trust of economic agents to the legal system as well as to information provided by networks

from friend, relatives, colleagues, partners, business associations and government agencies; degree of competition and pressure on the firm to innovate from customers, domestic and foreign competitors; variables that reflect experience of the firms in dealing with partners and a couple of financial indicators; industry and country controls. The study was conducted using data from a large survey of firms across 28 transition economies.

The main contribution of this study is that it provides new empirical insights into the casual link between trust-based relations and business performance of firms in transition economies. The results of the study suggest that informal trust-based institutions of contract governance represent an important way for enhancing of business performance in transition economies. To say distinctly, our findings indicate that in transition economies trade credits positively affect the business performance of firms. In particular, trust-based relations are associated with increased sales. They provide incentives for more intensive innovation activities and ensure higher labor productivity rates. The firms that trust their partners are characterized by larger proportions of reinvested profits as well. The main explanation of these findings is that developing of trust among economic agents allows for reduction of transaction costs, stimulates learning and continuous improvement; makes incentives for innovative activities (Sako, 2002) and thus it helps firms in enhancing of their overall business performance. Though, trust-based relations always contain a potential threat of inefficiencies that can arise when low-cost new entrant is excluded (McMillan and Woodruff, 1999), our results suggest that in the end such relationships are beneficial for firms in transition.

The data used in the analysis is well-balanced that makes the results of the study more reliable. However, the sensitivity test indicates that while the estimated effects of trade credit on some indicators of business performance is quite robust, its impacts on the other outcomes are rather sensitive to hidden bias. Another limitation of the study is that it employs only one proxy for trust-based relations and a limited number of performance outcomes indicators.

Thus, for the future research, we propose to investigate the casual links between trust-based relationships and business performance using alternative methods, including instrumental variables technique; employing various proxies for trust and diverse outcome variables. This will allow to supplement the propensity score matching procedure used in this study and to verify the robustness of our findings.

References.

1. Arrow, K.J. (1969) "The Organization of Economic Activity: Issues Pertinent to the Choice of Market versus Non- Market Allocation," in: *The Analysis and Evaluation of Public Expenditures: The PBB-System*, Joint Economic Committee, 91-st Cong., 1-st sess. (Washington D.C.: Government Printing Office).

2. Arrow, K.J. (1974) *The Limits of Organization* (New York: Norton).

3. Becker, S.O., and M. Caliendo (2007) "Sensitivity analysis for average treatment effects", *The Stata Journal*, 7(1), 71-83.

4. Berulava G. and D. Lezhava (2008) "The Impact of Trust on the Mode of Transaction Governance between Manufacturer and Distributor: Evidence from Georgia", *Eurasian Journal of Business and Economics*, Volume 1, № 2 (November), pp.1-32.

5. Bradach, J.L. and R.G. Eccles (1989) "Price, Authority, and Trust: From Ideal Types to Plural Forms," *Annual Review of Sociology* **15**, 97–118.

6. Carlin W., M. E. Schaffer and P. Seabright (2004). "A Minimum Rivalry: Evidence from in Transition Economies on the importance of Competition for Innovation and Growth", William Davidson Institute, working paper №. 670.

7. DiPrete, T. and M. Gangl (2005), "Assessing Bias in the Estimation of Causal Effects: Rosenbaum Bounds on Matching Estimators and Instrumental Variables Estimation with Imperfect Instruments", Sociological Methodology 35.

8. Dyer, J. H. and W. Chu (2003) "The Role of Trustworthiness in Reducing Transaction Costs and Improving Performance: Empirical Evidence from the United States, Japan and Korea." Organization Science. Jan/Feb, Vol. 14 Issue 1, pp: 57-68.

9. Dyer, J. H. (1996) "Does Governance Matter? Keiretsu Alliances and Asset Specificity as Sources of Japanese Competitive Advantage." *Organization Science*. Nov/Dec96, Vol. 7 Issue 6, pp: 649-666.

10. Granovetter, M. (1985) "Economic Action and Social Structure: The Problem of Embeddedness," *The American Journal of Sociology* **91** (3), 481–510.

11. Heide**,** J. B. and G. John (1992) "Do Norms Matter in Marketing Relationships?" *Journal of Marketing*, Vol. 56 Issue 2, pp: 32-44.

12. Helper, S. and M. Sako (1995) "Supplier Relations in the Auto Industry in Japan and the USA: Are they Converging?" *Sloan Management Review*, (Spring), pp: 77-84.

13. Hendley, K., P. Murrell, and R. Ryterman (1998) "Law, Relationships, and Private Enforcement: Transactional Strategies of Russian Enterprises," *WDI Working Paper* No.72, November.

14. Johnson S., J. McMillan and C. Woodruff (1999). "Contract Enforcement in Transition," *CESifo Working Paper Series, WP №211.*

15. Johnson S., J. McMillan and C. Woodruff (2002). "Property Rights and Finance," *American Economic Review*, Vol. 92 (5), pp. 1335-1356.

16. Lavie D., P. R. Haunschild, and P. Khanna (2012) "Organizational differences, relational mechanisms, and alliance performance." *Strategic Management Journal*, Vol. 33 Issue 13, pp: 1453-1479.

17. Lewis, D.J. and A. Weigert (1985) "Trust as a Social Reality," *Social Forces* **63** (4), 967–985.

18. Macaulay, S. (1963) "Non-Contractual Relations in Business: A Preliminary Study," *American Sociological Review* **28** (1), 55–67.

19. Mantel, N. and W. Haenszel (1959), "Statistical Aspects of the Analysis of Data from Retrospective Studies of Disease", Journal of the National Cancer Institute 22(4), 719-748.

20. McMillan, J. and C. Woodruff (1999) "Interfirm Relationships and Informal Credit in Vietnam," *Quarterly Journal of Economics*, No. 114, November, 1285–1320.

21. Nguyen, N. P. and N. T. Liem (2013) "Inter-Firm Trust Production: Theoretical Perspectives." International Journal of Business & Management, Vol. 8 Issue 7, pp: 46-54.

22. North, D. C. (1990). *Institutions, Institutional Change and Economic Performance*. Cambridge: Cambridge University Press.

23. Poppo L. and T. Zenger (2002) "Do Formal Contracts and Relational Governance Function as Substitutes or Complements?" *Strategic Management Journal*, 23, pp. 707-725.

24. Raiser, M., R. Allan, and F. Steves (2004) "Trust in Transition: Cross Country and Firm Evidence," *Working Paper* No.640 (Ann Arbor: The William Davidson Institute, University of Michigan).

25. Rosenbaum, P. R., and D. B. Rubin (1983) "The Central Role of Propensity Score in Observational Studies for Causal Effects," *Biometrika*, Vol. 70(1), pp. 41-55.

26. Rosenbaum, P. R. (2002) *Observational Studies.* New York: Springer. DiPrete, T. and Gangl, M. (2005), "Assessing Bias in the Estimation of Causal Effects: Rosenbaum Bounds on Matching Estimators and Instrumental Variables Estimation with Imperfect Instruments", *Sociological Methodology*, 35.

27. Sako, M. (2002) "Does Trust Improve Business Performance?" in: Christel Lane and Reinhard Bachmann, eds., *Trust Within and Between Organizations*: *Conceptual Issues and Empirical Applications* (Oxford: Oxford University Press).

28. Steer, L. and K. Sen (2010) "Formal and Informal Institutions in a Transition Economy: The Case of Vietnam." *World Development*, Vol. 38 Issue 11, pp: 1603-1615.

29. Wang Eric, Tai Jeffrey and Varun Grover (2013) "Examining the Relational Benefits of Improved Interfirm Information Processing Capability in Buyer-Supplier Dyads." *MIS Quarterly*, Vol. 37 Issue 1, pp: 149-173.

30. Wang, Xuehua and Zhilin Yang (2013) "Inter-firm opportunism: a meta-analytic review and assessment of its antecedents and effect on performance." *Journal of Business & Industrial Marketing*, Vol. 28 Issue 2, pp: 137-146.

31. World Bank (2001). *World Development Report 2002: Building Institutions for Markets*. The World Bank, Washington DC.

32. World Bank (2002). *Transition – The First Ten Years: Analysis and Lessons for Eastern Europe and the Former Soviet Union.* The World Bank, Washington DC

33. Zheng Zhou Kevin, Laura Poppo and Zhilin Yang (2008) "Relational Ties or Customized Contracts? An Examination of Alternative Governance Choices in China," *Journal of International Business Studies*, Vol. 39, No. 3 (Apr. - May), pp. 526-534

APPENDIX.

Table A1.1. Innovation: Correlation Matrix

	Developing successfully a major new product line/service	Developing successfully a major new product line/service	Upgrading an existing product line/service	Obtained a new quality accreditation (ISO 9000, 9002 or 14,000, AGCCP, etc)
Developing successfully a major new product line/service	1,000	,428***	,125***	,179***
Upgrading an existing product line/service	,428***	1,000	,119***	,169***
Creating a new joint venture with foreign partner	,125***	,119***	1,000	,122***
Obtained a new quality accreditation (ISO 9000, 9002 or 14,000, AGCCP, etc)	,179***	,169***	,122***	1,000
Notes: *** — significant at $p < 0.01$ level; ** — significant at $p < 0.05$ level; * — significant at $p < 0.1$ level.				

Table A1.2. Innovation: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,586
Bartlett's Test of Sphericity	Approx. Chi-Square	2659,955
	Degrees of freedom	6
	Significance	,000

Table A1.3. Innovation: Communalities

	Initial	Extraction
Developing successfully a major new product line/service	1,000	,653
Upgrading an existing product line/service	1,000	,622
Creating a new joint venture with foreign partner	1,000	,708
Obtained a new quality accreditation (ISO 9000, 9002 or 14,000, AGCCP, etc)	1,000	,540

Table A1.4. Innovation: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	Percent of Variance	Cumulative percent	Total	Percent of Variance	Cumulative percent
1	1,610	40,258	40,258	1,610	40,258	40,258
2	,951	23,786	64,044			
3	,866	21,657	85,701			
4	,572	14,299	100,000			

Table A1.5. Innovation: Component Matrix

Variables	Component
	1
Developing successfully a major new product line/service	,770
Upgrading an existing product line/service	,763
Creating a new joint venture with foreign partner	,410
Obtained a new quality accreditation (ISO 9000, 9002 or 14,000, AGCCP, etc)	,518

Table A2.1. Legal System: Correlation Matrix

	Court fair and honest	Court quick and affordable	Court can enforce
Court fair and honest	1,000	,644***	,543***
Court quick and affordable	,644***	1,000	,576***
Court can enforce	,543***	,576***	1,000
Notes: *** — significant at $p < 0.01$ level; ** — significant at $p < 0.05$ level; * — significant at $p < 0.1$ level.			

Table A2.2. Legal System: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,707
Bartlett's Test of Sphericity	Approx. Chi-Square	7986,335
	Degrees of freedom	3
	Significance	,000

Table A2.3. Legal System: Communalities

	Initial	Extraction
Court fair and honest	1,000	,736
Court quick and affordable	1,000	,762
Court can enforce	1,000	,678

Table A2.4. Legal System: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	Percent of Variance	Cumulative percent	Total	Percent of Variance	Cumulative percent
1	2,177	72,551	72,551	2,177	72,551	72,551
2	,471	15,694	88,246			
3	,353	11,754	100,000			

Table A2.5. Legal System: Component Matrix

Variables	Component
	1
Court fair and honest	,858
Court quick and affordable	,873
Court can enforce	,824

Table A3.1. Network Variables: Correlation Matrix

	Family and friend networks	Employees and managers networks	Customer/ suppliers network	Government agencies networks	Business associations network	Trade fairs /others network
Family and friend networks	1,000	,475***	,314***	,143***	,206***	,155***
Employees and managers networks	,475***	1,000	,378***	,377***	,423***	,326***
Customer/ suppliers network	,314***	,378***	1,000	,149***	,265***	,322***
Government agencies networks	,143***	,377***	,149***	1,000	,495***	,271***
Business associations network	,206***	,423***	,265***	,495***	1,000	,519***
Trade fairs /others network	,155***	,326***	,322***	,271***	,519***	1,000
Notes: *** — significant at $p < 0.01$ level; ** — significant at $p < 0.05$ level; * — significant at $p < 0.1$ level.						

Table A3.2. Network Variables: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		,734
Bartlett's Test of Sphericity	Approx. Chi-Square	11694,514
	Degrees of freedom	15
	Significance	,000

Table A3.3. Network Variables: Communalities

	Initial	Extraction
Family and friend networks	1,000	,716
Employees and managers networks	1,000	,650
Customer/ suppliers network	1,000	,501
Government agencies networks	1,000	,580
Business associations network	1,000	,739
Trade fairs /others network	1,000	,527

Table A3.4. Network Variables: Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	Percent of Variance	Cumulative percent	Total	Percent of Variance	Cumulative percent
1	2,637	43,953	43,953	2,637	43,953	43,953
2	1,077	17,947	61,899	1,077	17,947	61,899
3	,824	13,740	75,640			
4	,609	10,158	85,798			
5	,449	7,488	93,286			
6	,403	6,714	100,000			

Table A3.5. Network Variables: RotatedComponent Matrix

Variables	Component	
	1	2
Family and friend networks	-,005	,846
Employees and managers networks	,417	,690
Customer/ suppliers network	,194	,681
Government agencies networks	,759	,065
Business associations network	,838	,191
Trade fairs /others network	,694	,211

Table A4. Trade Credit's Effect ATT estimation: Balance Checking

Covariates	Sales growth			Labor productivity			Percentage of reinvestment			Innovation		
	% of bias	t-test		% of bias	t-test		% of bias	t-test		% of bias	t-test	
		t	p-value		t	p-value		t	p-value		t	p-value
Legal system	-2.4	-0.79	0.428	-1.2	-0.34	0.734	-2.4	-0.72	0.470	-4.5	-1.46	0.144
Narrow networks	-3.4	-1.12	0.262	-4.2	-1.22	0.223	-3.2	-0.99	0.324	-3.7	-1.21	0.228
Broad networks	-1.3	-0.43	0.671	-1.6	-0.46	0.643	-1.2	-0.36	0.721	0.4	0.12	0.901
Internal funds/working capital	0.5	0.14	0.885	-0.3	-0.08	0.936	-0.7	-0.21	0.834	-0.4	-0.12	0.908
Internal funds/new fixed investment	1.3	0.40	0.689	0.7	0.20	0.841	-0.7	-0.19	0.848	1.0	0.31	0.754
Payment delay	-0.6	-0.19	0.850	-0.9	-0.28	0.782	0.2	0.08	0.940	0.0	0.01	0.995
Service	1.5	0.51	0.608	1.1	0.31	0.753	1.1	0.34	0.737	-0.3	-0.09	0.927
New	1.2	0.38	0.704	2.0	0.59	0.558	1.3	0.39	0.69	0.6	0.20	0.840
Sales to government	-2.2	-0.77	0.440	-3.5	-1.03	0.305	-2.4	-0.77	0.442	-3.1	-1.05	0.296
Sales to multinationals	-4.4	-1.24	0.215	-3.8	-0.94	0.349	-6.1	-1.53	0.127	-	-	-
Customer change	0.7	0.24	0.813	1.7	0.48	0.633	2.3	0.69	0.490	-	-	-
Competition_1 (no competitors)	-0.4	-0.12	0.903	-0.1	-0.03	0.979	0.3	0.11	0.912	1.6	0.54	0.586
Competition_2 (1-3 competitors)	-1.1	-0.37	0.713	-0.4	-0.11	0.911	1.5	0.45	0.656	-1.9	-0.61	0.543
Pressure from domestic competitors_1	-	-	-	-	-	-	-	-	-	-2.6	-0.90	0.367
Pressure from domestic competitors_2	-	-	-	-	-	-	-	-	-	-0.1	-0.04	0.970
Pressure from domestic competitors_3	-	-	-	-	-	-	-	-	-	-0.2	-0.05	0.959
Pressure from foreign competitors_1	-	-	-	-	-	-	-	-	-	-1.2	-0.40	0.690
Pressure from foreign competitors_2	-	-	-	-	-	-	-	-	-	0.9	0.28	0.780
Pressure from foreign competitors_3	-	-	-	-	-	-	-	-	-	2.9	0.90	0.370
Pressure from customers_1	-	-	-	-	-	-	-	-	-	-0.5	-0.17	0.868
Pressure from customers_2	-	-	-	-	-	-	-	-	-	-4.0	-1.39	0.164
Pressure from customers_3	-	-	-	-	-	-	-	-	-	-1.5	-0.49	0.623

Table A5. Trade Credit: Summary of Units off and on Support

Dependent Variables	**Treatment Assignment**	**Off support**	**On Support**	**Total**
Sales growth	Untreated	0	1,976	1,976
	Treated	23	2,155	2,178
	Total	***23***	***4,131***	***4,154***
Labor productivity	Untreated	0	1,396	1,396
	Treated	18	1,657	1,675
	Total	***18***	***3,053***	***3,071***
Percentage of reinvestment	Untreated	0	1,698	1,698
	Treated	14	1,845	1,859
	Total	***14***	***3,543***	***3,557***
Innovation	Untreated	0	1,913	1,913
	Treated	3	2,113	2,116
	Total	3	4,026	4,029